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SUBTASK UPDATE MEMORANDUM

Task: 1.3 Adequacy and validity of meteorological measurements

Subtask: 5 Adequacy of the vertical radar and RASS coverage during stagnation

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An examination of RASS data at the Angiola site was performed during the CRPAQS Winter IOPs when stagnation occurred. A summary of the examination is provided below.

Three IOP periods were evaluated. The periods were 12/15/00 to 12/18/00, 12/26/00 and 12/28/00 (tower data for 12/27/00 were missing) and 1/4/01 to 1/7/01. Data from the 100-meter tower were combined with the RASS data, though data from the 23-meter on the level were removed from the comparison, as they appeared to be biased high relative to the other levels on the tower. Each of the combined tower/RASS profiles was evaluated to determine how well the inversion and mixing information was represented in the profile. In particular, the ability to identify or detect the inversion base was of interest as this most likely represented the top of the fog, or mixed layer. Each profile during the IOP periods was assigned a coded type that represented how well the RASS performed in identifying inversion phenomena under various scenarios. These "types" were as follows:

"1" RASS correctly detects the inversion base.

"2" Inversion below lowest RASS gate separate from inversion noted in RASS sounding. These inversions are usually at least partially identified if surface temperature data (10 meter) is included.

"3" Inversion base is below lowest RASS gate, but tower data shows inversion is elevated. Surface temperature is lower than that of lowest RASS gate.

"4" Inversion base is below lowest RASS gate, but tower data shows inversion is elevated. Surface temperature is higher than that of lowest RASS gate.

"5" Inversion base is below lowest RASS gate, and tower data show inversion going to surface.

"6" Inversion base is below lowest RASS gate, but a second, lower inversion also exists, based on tower data. Surface temperature is lower than that of lowest RASS gate. Usually associated with a broad inversion extending well into upper levels.

"7" Inversion base is below lowest RASS gate, but a second, lower inversion also exists, based on tower data. Surface temperature is higher than that of lowest

RASS gate. Generally shown with roughly adiabatic conditions above the relatively narrow RASS-identified inversion.

"8" RASS sounding does not show an inversion, but tower data shows inversion exists at or near surface. Inversion is identified if surface data is included.

"9" Though not actually present in either the tower or RASS data, an elevated inversion is implied when comparing temperatures at the top of the tower with those at the lowest RASS gate.

"10" While an inversion is identified in the RASS profile, a second, lower inversion is implied when comparing temperatures at the top of the tower with those at the lowest RASS gate.

Figures 1 through 3 demonstrate examples for each of the above types.

The analysis included 234 hours of comparison RASS / tower soundings. **Table 1** summarizes the results of the typing. Also show is a generalized estimate of the representativeness, or ability to identify the bottom of the inversion, given only the surface (10-meter) data and the RASS sounding. For example, if only surface and RASS data were used, type 3 would imply an inversion to the surface, when it appears that the inversion did not begin until above 100 meters. Similarly, type 9 would be viewed as a surface inversion, when it is not, whereas the reverse is true for type 6. Type 10, which shows the base of the inversion above 200 meters must actually have an inversion at a significantly lower level.

In performing the analysis, it has been assumed that the RASS data are accurate. Many profiles, such as that depicted for type 7, would be difficult to resolve from a physical standpoint, and several examples seem to show a discontinuity between RASS and tower data, though all data were converted to virtual temperature.

However, within the limitations of this review, Table 1 shows that 25.6% of the data are likely representative, 39.8% are possibly representative, and 34.6% are likely not representative, at least in terms of identifying the base of the inversion layer / top of the mixing layer.

Table 1. Summary of Type Categorization

Type	Count	Representativeness
1	7	Likely
2a	50	Possible
2b	7	Unlikely
3	19	Unlikely
4	22	Likely
5	19	Likely
6	30	Unlikely
7	43	Possible
8	12	Likely
9	6	Unlikely
10	19	Unlikley

Note: Code 2 had 7 instances where the lowest RASS gate temperature was less than the surface temperature (10-m), and the inversion may not have been identified. These are coded 2b.

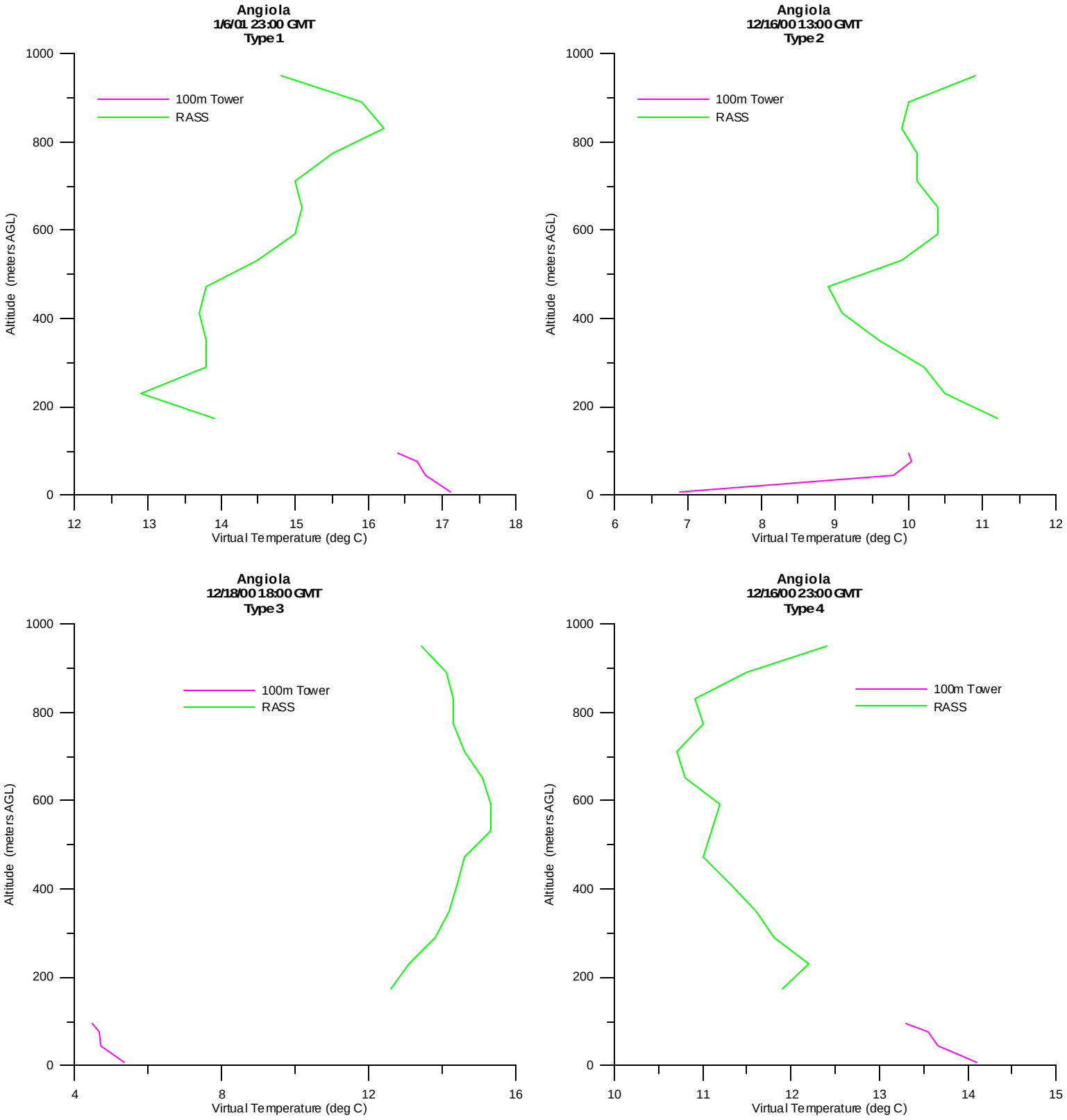

Figure 1. "Type" Examples

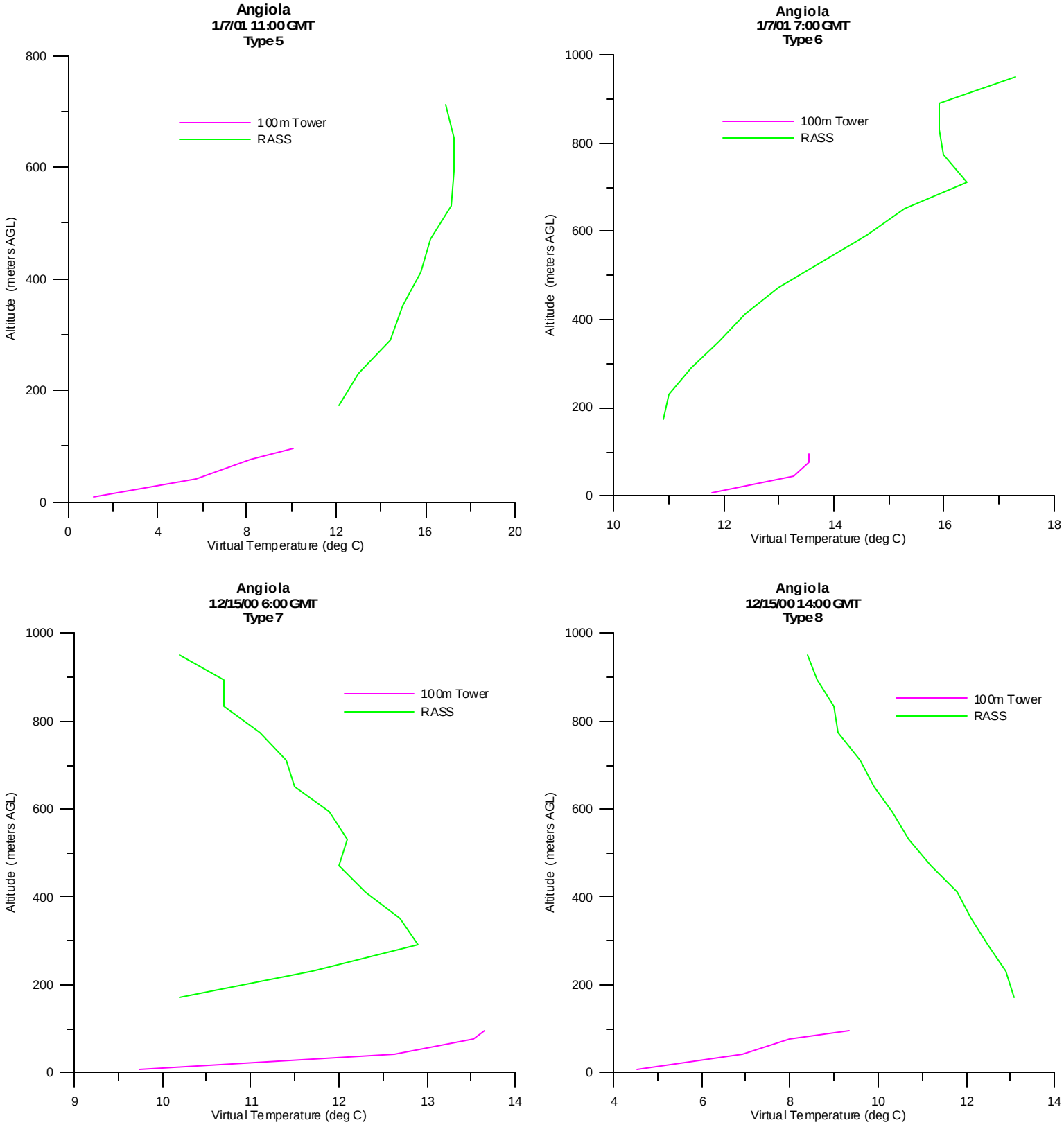

Figure 2. "Type" Examples

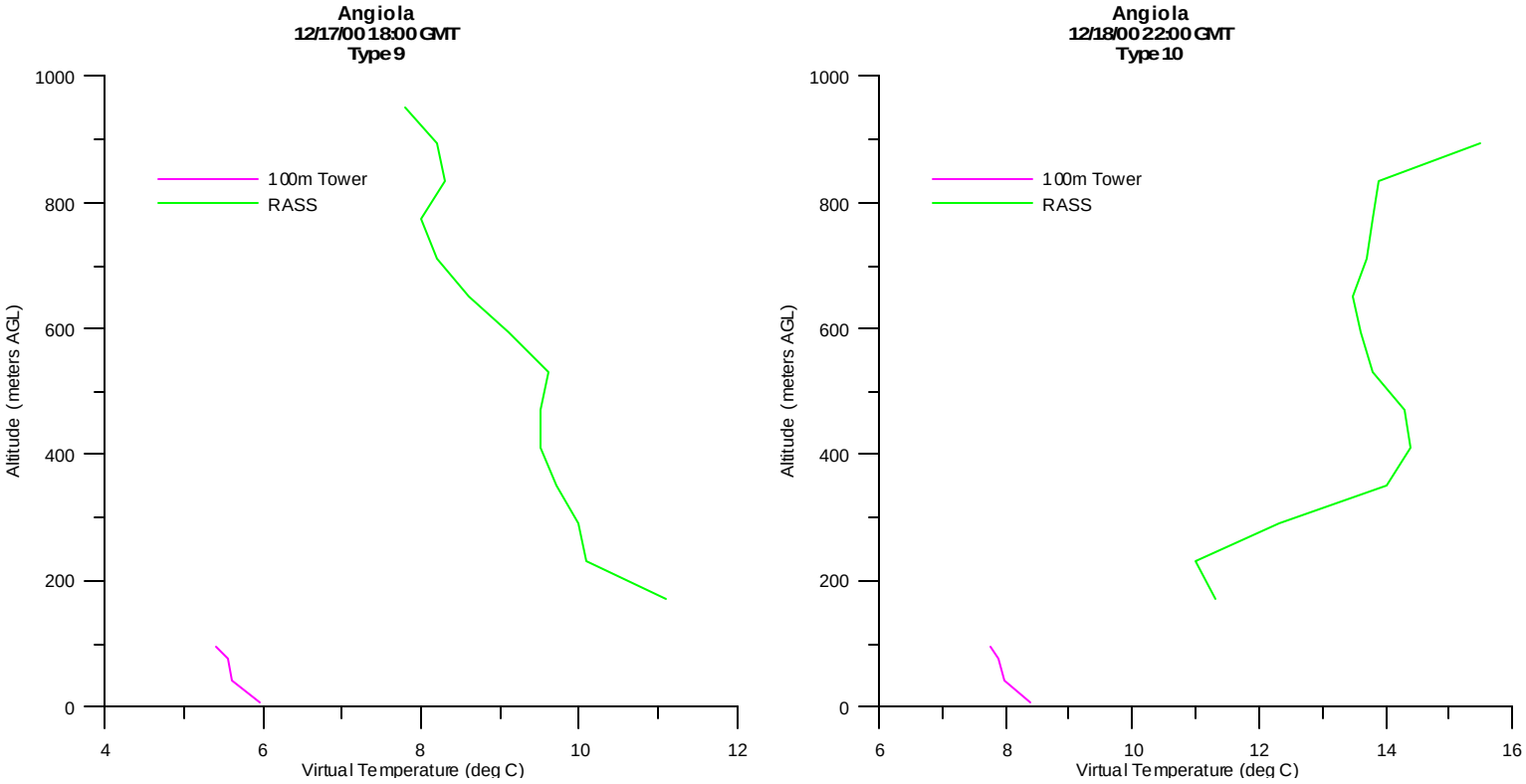

Figure 3. "Type" Examples